AMENDMENTS TO THE CLAIMS

1. (Currently Amended) A method for ~~the~~ highly sensitive simultaneous measurement of nonlinear optical emission signals, spatially resolved in one or two spatial dimensions, comprising:

- radiating ~~the~~ excitation light from at least one light source in a power-modulated and/or pulse-duration-modulated form into ~~an~~ interaction spaces~~volume or to an interaction area or an interaction layer (referred to jointly by the designation "interaction spaces")~~, in each of which ~~interaction spaces~~ one or a plurality of emissions that are correlated nonlinearly with the excitation light can be excited,
- measuring ~~the~~ light emerging from said interaction spaces by means of a one- or two-dimensional detector array,
- transmitting ~~the~~ measurement data from said detector array to a computer and formatting the data in a one- or multidimensional data matrix,

characterized in that data representative of those portions of the light emerging from the interaction spaces which are linearly proportional to the intensity of the excitation light available in the interaction spaces are separated from data representative of the portions of the light emerging from the interaction spaces which are nonlinearly proportional to the available excitation light intensity.

2. (Currently Amended) The method as claimed in claim 1, ~~characterized in that it~~wherein the method does not comprise any spectral filtering of the light that is to be detected and ~~emerges~~ emerge from the interaction spaces.

3. (Currently Amended) The method as claimed in claim 1, ~~characterized in that it~~wherein the method is carried out in combination with a spectral filtering of the light that is to be detected and emerge ~~emerges~~ from the interaction spaces.

4. (Currently Amended) The method as claimed in claim 1~~one of claims 1 – 3~~, ~~characterized in that~~ wherein said one- or two-dimensional detector array is selected from the group ~~comprising~~ consisting of CCD cameras, CCD chips, CMOS cameras, CMOS chips,

photodiode arrays, avalanche diode arrays, multichannel plates and multichannel photomultipliers, ~~it being possible for~~wherein a phase-sensitive demodulation ~~to be~~is capable of being integrated into said detector array.

5. (Currently Amended) The method as claimed in ~~one of claims 1 - 4~~claim 1, ~~characterized in that~~ wherein the modulation of the excitation light radiated ~~in to~~into an interaction space is effected by means of optomechanical and/or acousto-optical and/or electro-optically active auxiliary means.

6. (Currently Amended) The method as claimed in claim 5, ~~characterized in that~~wherein said optomechanical and/or acousto-optical and/or electro-optically active auxiliary means are selected from the group ~~comprising~~ consisting of mechanical shutters and rotating choppers which in each case alternately block and release the light path between the excitation light source and the interaction space, polarization-selective components ~~such as, for example, rotating half-wave plates in combination with polarizers, liquid crystal attenuators, electro-optically active crystals, neutral density filters~~ that are locally or temporally variable in terms of their transmission, acousto-optical modulators and ~~also~~ modulators based on interference effects~~, such as, for example, Michelson interferometers or Mach-Zehnder interferometers~~.

7. (Currently Amended) The method as claimed in ~~one of claims 1 - 4~~claim 1, ~~characterized in that~~wherein the modulation of the excitation light radiated into~~in to~~ an interaction space is effected by means of direct, active modulation of the light radiated from the excitation light source.

8. (Currently Amended) The method as claimed in claim 7, ~~characterized in that~~wherein the modulation of the excitation light radiated ~~in to~~into an interaction space is effected by means of modulation of the excitation current of~~for~~ a semiconductor laser as excitation light source.

9. (Currently Amended) The method as claimed in ~~one of claims 1 - 8~~claim 1, ~~characterized in that~~wherein the modulation of the excitation light radiated ~~in to~~into an interaction space is effected periodically.

10. (Currently Amended) The method as claimed in ~~one of claims 1 - 8~~claim 1, ~~characterized in that~~ wherein the modulation of the excitation light radiated ~~in to~~into an interaction space is effected non-periodically.

11. (Currently Amended) The method as claimed in ~~one of claims 1 - 10~~claim 1, ~~characterized in that~~ wherein the modulation of the excitation light radiated ~~in to~~into an interaction space consists of~~in the~~ modulation of the intensity radiated in.

12. (Currently Amended) The method as claimed in ~~one of claims 1 - 10~~claim 1, ~~characterized in that~~ wherein the modulation of the excitation light radiated ~~in to~~into an interaction space consists of~~in~~ the simultaneous modulation of the pulse duration and the peak power of the excitation light radiated in~~, the peak power preferably being varied inversely proportionally to the pulse duration and the integral of the pulse power particularly preferably remaining constant~~.

13. (Currently Amended) The method as claimed in ~~one of claims 1 - 12~~claim 1, ~~characterized in that it~~wherein the method is effected without detection of the modulated excitation light or a measurement variable proportional thereto.

14. (Currently Amended) The method as claimed in ~~one of claims 1 - 12~~claim 1, ~~characterized in that it comprises~~wherein, in addition to the detection of the light emerging from the interaction spaces, the detection of the modulated excitation light or a measurement variable proportional thereto is detected.

15. (Currently Amended) The method as claimed in ~~one of claims 1 - 14~~claim 1, ~~characterized in that~~ wherein the detection of the light emerging from the interaction spaces is effected ~~in a manner~~ temporally correlated with the modulation of the excitation light power.

16. (Currently Amended) The method as claimed in claim 15, ~~characterized in that~~ wherein the detection of the light emerging from the interaction spaces is effected with a frequency corresponding to an integer multiple of the modulation frequency of the excitation light power.

17. (Currently Amended) The method as claimed in ~~one of claims 1 - 16~~claim 1, ~~characterized in that~~wherein the separation of the data representative of the ~~response signal~~ portions of the light emerging from the interaction ~~space that~~spaces which are ~~correlated~~ nonlinearly ~~with~~ proportional to the excitation light power from the data representative of the remaining ~~signal~~ portions of said light is effected ~~with the aid of~~ using a parallel series expansion.

18. (Currently Amended) The method as claimed in ~~one of claims 1 - 17~~ claim 1, ~~characterized in that~~wherein the separation of the data representative of the ~~response signal~~ portions of the light emerging from the interaction ~~space that~~spaces which are ~~correlated~~ nonlinearly proportional to ~~with~~ the excitation light power from the data representative of the remaining ~~signal~~ portions of said light is effected ~~with the aid of~~ using a parallel Taylor expansion.

19. (Currently Amended) The method as claimed in ~~one of claims 1 - 16~~claim 1, ~~characterized in that~~wherein the separation of the data representative of the ~~response signal~~ portions of the light emerging from the interaction ~~space that~~spaces which are ~~correlated~~ nonlinearly proportional to ~~with~~ the excitation light power from the data representative of the remaining ~~signal~~ portions of said light is effected ~~with the aid of~~ using a harmonic analysis.

20. (Currently Amended) The method as claimed in ~~one of claims 1 - 16~~claim 1, ~~characterized in that~~wherein the separation of the data representative of the ~~response signal~~ portions of the light emerging from the interaction ~~space that~~spaces which are ~~correlated~~ nonlinearly proportional to ~~with~~ the excitation light power from the data representative of the remaining ~~signal~~ portions of said light is effected by means of a stepped modulation of the excitation light power.

21. (Currently Amended) The method as claimed in claim 1~~one of claims 1 - 16~~, ~~characterized in that~~wherein the separation of the data representative of the ~~the response signal~~ portions of the light emerging from the interaction ~~space that~~ spaces which are ~~correlated~~ nonlinearly proportional to ~~with~~ the excitation light power from the data representative of the remaining ~~signal~~ portions of said light is effected using a four-step algorithm for the modulation of the excitation light power.

22. (Currently Amended) The method as claimed in ~~one of claims 1 - 21~~claim 1, ~~characterized in that~~ wherein in case of a modulation of the excitation light power experimentally dictated deviations of the excitation light powers from the desired values provided for the modulation are compensated for ~~by means of~~using numerical corrections.

23. (Currently Amended) The method as claimed in ~~one of claims 21 - 22~~claim 21, ~~characterized in that the response signals~~wherein the data representative of the light emerging from the interaction spaces obtained ~~measured~~ using a four-step algorithm for the modulation are multiplied by correction factors.

24. (Currently Amended) The method as claimed in claim 23, ~~characterized in that~~wherein the correction factors ~~for the response signals~~ are determined from measured excitation light powers ~~for the generation of said response signals~~.

25. (Currently Amended) The method as claimed in claim 23, ~~characterized in that~~wherein the correction factors for the response signals are determined by a numerical analysis of the ~~response signal~~ data representative of the light emerging from the interaction spaces generated~~, it being possible for this to be effected for example by evaluation of the signals from partial regions identified for this of an interaction space or with the aid of separate measurements (for example using a calibration sample)~~.

26. (Currently Amended) The method as claimed in ~~one of claims 1 - 25~~claim 1, ~~characterized in that~~wherein the separation of the data representative of the ~~the response signal~~ portions of the light emerging from the interaction ~~space that~~ spaces which are ~~correlated~~ nonlinearly ~~with~~ proportional to the excitation light power from the data representative of the remaining ~~signal~~ portions of said light is effected in real time contemporaneously ~~(within the recording time for the signal recording)~~ with the recording of the signals from the interaction space.

27. (Currently Amended) The method as claimed in ~~one of claims 1 - 26~~claim 1, ~~characterized in that~~wherein the interaction space is an interaction layer at a surface of a fixed carrier, the areal extent of ~~the~~ said interaction layer ~~space (on said surface of this carrier)~~ being defined by the interaction area with the impinging power-modulated excitation light and its depth ~~(extent perpendicular to said surface of the carrier)~~ being defined by the range of the modulated excitation light intensity in this space dimension perpendicular to said surface of the carrier.

28. (Currently Amended) The method as claimed in claim 27, ~~characterized in that there are situated within the interaction space~~ wherein compounds or substances or molecular subgroups are situated within the interaction space which, under the action of the excitation light, are capable of emitting optical signals correlated nonlinearly therewith, or with the aid of which, after the interaction thereof with further compounds present in the interaction space, optical signals correlated nonlinearly with the excitation light can be generated.

29. (Currently Amended) The method as claimed in claim 27, ~~characterized in that there~~ wherein one or a plurality of specific binding partners for the detection of one or a plurality of analytes are immobilized on the surface of said fixed carrier ~~one or a plurality of specific binding partners for the detection of one or a plurality of analytes~~ in a binding assay ~~(with the binding partner from a supplied solution binding to the immobilized binding partner)~~, the analyte detection being effected on the basis of an optical response ~~signal—~~signal, correlated nonlinearly with the excitation light power, ~~power—~~of the immobilized binding partner itself or of a~~the~~ binding partner supplied in solution for binding to the immobilized binding partner or of one or a plurality of further binding partners supplied in one or a plurality of additional method steps.

30. (Currently Amended) The method as claimed in claim 29, ~~characterized in that~~ wherein the specific binding partners immobilized on the surface of said fixed carrier are the one or the plurality of analytes themselves which are immobilized, wherein the one or the plurality of analytes are ~~in a manner~~ embedded in a native sample matrix or in a ~~form of the~~ sample matrix that is modified by ~~means of~~ one or a plurality of conditioning steps.

31. (Currently Amended) The method as claimed in claim 29, ~~characterized in that~~wherein the specific binding partners immobilized on the surface of said fixed carrier are biological or biochemical or synthetic identification elements for the specific identification of one or a plurality of analytes situated in a supplied sample.

32. (Currently Amended) The method as claimed in ~~one of claims 29 - 31~~claim 29, ~~characterized in that~~wherein said binding partners~~, that is to say the analytes to be detected that are themselves immobilized or the analytes to be detected in a supplied sample and/or their biological or biochemical or synthetic identification elements that are immobilized or supplied in a supplied detection reagent,~~ are selected from the group ~~comprising~~ consisting of proteins, ~~for example monoclonal, or polyclonal antibodies and antibody fragments,~~ peptides, enzymes, glycopeptides, oligosaccharides, lectins, antigens for antibodies, proteins functionalized with additional binding sites ~~("tag proteins", such as, for example, "histidine tag proteins")~~, ~~and also~~ nucleic acids, ~~(for example DNA, RNA, oligonucleotides) and~~ nucleic acid analogs ~~(e.g. PNA)~~, aptamers, membrane-bound and isolated receptors and ligands thereof, cavities produced by chemical synthesis for receiving molecular imprints, natural polymers and synthetic polymers~~, etc~~.

33. (Currently Amended) The method as claimed in ~~one of claims 28 – 32~~claim 28, ~~characterized in that,~~ wherein the compounds or substances or molecular subgroups are applied on the surface of said fixed carrier, ~~applied compounds or substances or molecular subgroups which, under the action of the excitation light, are capable of emitting optical signals correlated nonlinearly therewith, or with the aid of which, after the interaction thereof with further compounds present in the interaction space, optical signals correlated nonlinearly with the excitation light can be generated, or applied specific binding partners~~and are immobilized in discrete measurement regions ~~(spots)~~ which may have an arbitrary geometry~~, for example circular, oval, triangular, rectangular, polygonal form, etc., it being possible for~~ wherein an individual measurement region can optionally ~~to~~ contain identical or different compounds or substances or molecular subgroups or specific binding partners.

34. (Currently Amended) The method as claimed in claim 33, ~~characterized in that~~wherein discrete measurement regions are produced by spatially selective application of specific binding partners on said fixed carrier or of compounds or substances or molecular subgroups which, under the action of the excitation light, are capable of emitting optical signals correlated nonlinearly therewith, or with the aid of which, after the interaction thereof with further compounds present in the interaction space, optical signals correlated nonlinearly with the excitation light can be generated~~, or of specific binding partners on said fixed carrier, preferably using one or a plurality of methods from the group of methods comprising "inkjet spotting", mechanical spotting, "microcontact printing", fluidic contacting of the regions for the measurement regions to be created with the compounds to be immobilized by supplying the latter in parallel or crossed microchannels, under the action of pressure differences or electrical or electromagnetic potentials, and also photochemical and photolithographic immobilization methods~~.

35. (Currently Amended) The method as claimed in ~~one of claims 33 - 34~~claim 33, ~~characterized in that~~ wherein there are applied between the spatially separate measurement regions or in unoccupied partial regions within said measurement regions compounds that are ~~"chemically neutral"~~chemically neutral with respect to the analytes and/or with respect to ~~its~~ binding partners~~, preferably for example comprising the groups comprising albumins, in particular calf serum albumin or human serum albumin, casein, nonspecific, polyclonal or monoclonal antibodies, heterologous antibodies or antibodies that are empirically nonspecific to the analyte or analytes to be detected and the binding partners thereof (in particular for immunoassays), detergents -- such as, for example, Tween 20 -, fragmented natural or synthetic DNA that does not hybridize with polynucleotides to be analyzed, such as, for example, extracts of herring or salmon sperm (in particular for polynucleotide hybridization assays), or else uncharged but hydrophilic polymers, such as, for example, polyethylene glycols or dextrans~~.

36. (Currently Amended) The method as claimed in claim 28~~one of claims 28 - 32~~, wherein~~characterized in that~~, at the surface of said fixed carrier, the~~applied~~ compounds or substances or molecular subgroups are applied ~~which, under the action of the excitation light, are capable of emitting optical signals correlated nonlinearly therewith, or with the aid of which, after the interaction thereof with further compounds present in the interaction space, optical signals correlated nonlinearly with the excitation light can be generated~~, or ~~applied~~ specific binding partners are applied wherein such are immobilized directly or by means of a ~~so-called~~ spacer ~~(formed~~ formed as an independent molecule or molecular ~~group)~~group at the surface of said fixed carrier, with utilization of one or a plurality of types of interactions from the group of interactions ~~comprising~~ consisting of hydrophilic interactions, electrostatic interactions and covalent binding.

37. (Currently Amended) The method as claimed in ~~one of claims 28 - 36~~claim 28, ~~characterized in that~~wherein an adhesion promoting layer is applied between the surface of said fixed carrier and the immobilized compounds or substances or molecular subgroups~~, which, under the action of the excitation light, are capable of emitting optical signals correlated nonlinearly therewith, or with the aid of which, after the interaction thereof with further compounds present in the interaction space, optical signals correlated nonlinearly with the excitation light can be generated,~~ or the applied specific binding partners~~, which adhesion promoting layer preferably has a thickness of less than 200 nm, particularly preferably of less than 20 nm, and preferably comprises a chemical compound from the groups comprising silanes, functionalized silanes, epoxides, functionalized, charged or polar polymers and "self-assembled passive or functionalized monolayers or multilayers", thiols, alkyl phosphates and phosphonates, multifunctional block copolymers, such as, for example, poly(L)lysine/polyethylene glycols~~.

38. (Currently Amended) The method as claimed in ~~one of claims 31 - 37~~claim 33, ~~characterized in that~~wherein more than 10~~, preferably more than 100, particularly preferably more than 1000~~ measurement regions are arranged on a square centimeter in a two-dimensional arrangement on the surface of said fixed carrier.

39. (Currently Amended) The method as claimed in claim 27~~one of claims 27 - 38~~, ~~characterized in that~~ wherein said fixed carrier is optically transparent at the wavelength of an~~the~~ acting excitation light.

40. (Currently Amended) The method as claimed in ~~one of claims 27 - 39~~claim 27, ~~characterized in that~~wherein said fixed carrier is essentially planar.

41. (Currently Amended) The method as claimed in ~~one of claims 27 - 40~~claim 27, ~~characterized in that~~wherein said fixed carrier comprises an optical waveguide structure~~,~~ comprising one or a plurality of layers.

42. (Currently Amended) The method as claimed in ~~one of claims 27 - 41~~claim 27, ~~characterized in that~~ wherein said fixed carrier comprises a planar optical waveguide that is continuous or divided into discrete wave-guiding regions~~regions,~~ comprising one or a plurality of layers.

43. (Currently Amended) The method as claimed in ~~one of claims 27 - 42~~claim 27, ~~characterized in that~~ wherein said fixed carrier comprises a planar optical thin-film waveguide with an essentially optically transparent, wave-guiding layer (a) on a second, ~~likewise~~ essentially optically transparent layer (b) having a lower refractive index than layer (a) and~~, if appropriate, a likewise~~ optionally an essentially optically transparent intermediate layer (b') between layer (a) and layer (b) ~~likewise~~ having a lower refractive index than layer (a).

44. (Currently Amended) The method as claimed in claim 41~~one of claims 41 - 43~~, ~~characterized in that~~wherein a wave-guiding layer of said fixed carrier is in optical contact with one or a plurality of optical coupling elements which enable excitation light to be coupled into said wave-guiding layer, said optical coupling elements being selected from the group consisting of prism couplers, evanescent couplers with united optical waveguides with overlapping evanescent fields, end face couplers with focusing lenses~~, preferably cylindrical lenses,~~ arranged before an end side of said wave-guiding layer of the evanescent field sensor platform, and grating couplers.

45. (Currently Amended) The method as claimed in ~~one of claims 41 - 44~~claim 41, ~~characterized in that~~wherein a wave-guiding layer of the fixed carrier comprises one or a plurality of grating structures (c) which enable excitation light to be coupled in~~ are fashioned in a wave-guiding layer of the fixed carrier~~.

46. (Currently Amended) The method as claimed in ~~one of claims 41 - 45~~claim 45, ~~characterized in that~~ wherein a wave-guiding layer of the fixed carrier comprises one or a plurality of grating structures (c') having an identical or different grating period and grating depth with respect to grating structures (c) ~~are fashioned in a wave-guiding layer of the fixed carrier~~ and enable light guided in said wave-guiding layer to be coupled out.

47. (Currently Amended) The method as claimed in ~~one of claims 1 - 46~~claim 1, ~~characterized in that~~wherein said ~~optical emission signals that~~ data representative of the portion of the light emerging from the interaction spaces which are ~~correlated~~ nonlinearly ~~with~~ proportional to the excitation light intensity comprise the data representative of signals of a frequency doubling ~~("second harmonic generation")~~, summation or differential frequency generation.

48. (Currently Amended) The method as claimed in ~~one of claims 1 - 47~~claim 1, ~~characterized in that~~wherein said ~~optical emission signals that~~ data representative of the portion of the light emerging from the interaction spaces which are ~~correlated~~ nonlinearly proportional to ~~with~~ the excitation light intensity are induced by a multi-photon absorption.

49. (Currently Amended) The method as claimed in claim 48, ~~characterized in that said optical emission signals that are correlated nonlinearly with the excitation light intensity are induced by~~ wherein said multiphoton absorption is a two-photon absorption.

50. (Currently Amended) An analytical system for ~~the~~ highly sensitive simultaneous measurement of nonlinear optical emission signals, spatially resolved in one or two spatial dimensions, comprising:

- at least one light source for emitting excitation light,
- technical auxiliary means for ~~the~~ power modulation and/or pulse duration modulation of the excitation light emerging from the at least one light source,
- an interaction volume or an interaction area or an interaction layer, designated jointly as interaction space~~"interaction space"~~, wherein one or a plurality of emissions that are correlated nonlinearly with the excitation light can be excited,
- at least one one- or two-dimensional detector array for measuring the light emerging from the interaction space,
- a computer to which the measurement data of said detector arrays are transmitted and with the aid of which the measurement data are formatted in a one- or multidimensional data matrix and analyzed,

~~characterized in that~~ wherein data representative of those portions of the light emerging from the interaction spaces which are linearly proportional to the intensity of the excitation light available in the interaction spaces are separated from data representative of the portions of the light emerging from the interaction spaces which are nonlinearly proportional to the available excitation light intensity.

51. (Currently Amended) The analytical system as claimed in claim 50, ~~characterized in that it~~ wherein the method does not comprise any components for a spectral filtering of the light that is to be detected and emerge ~~emerges~~ from the interaction spaces.

52. (Currently Amended) The analytical system as claimed in claim 50, ~~characterized in that~~ wherein the method ~~it~~ additionally comprises components for a spectral filtering of the light that is to be detected and emerge~~emerges~~ from the interaction spaces.

53. (Currently Amended) The analytical system as claimed in ~~one of claims 50 - 52~~claim 50, ~~characterized in that the~~wherein at least one one- or two-dimensional detector array is selected from the group ~~comprising~~ consisting of CCD cameras, CCD chips, CMOS cameras, CMOS chips, photodiode arrays, avalanche diode arrays, multichannel plates and multichannel photomultipliers, ~~it being possible for~~ such that a phase-sensitive demodulation is capable of being ~~to be~~ integrated into said detector array.

54. (Currently Amended) The analytical system as claimed in ~~one of claims 50 - 53~~claim 50, ~~characterized in that~~wherein said technical auxiliary means for the modulation of the excitation light radiated in to an interaction space are selected from the group consisting of ~~comprising~~ optomechanical, acousto-optical and electro-optically active auxiliary means.

55. (Currently Amended) The analytical system as claimed in claim 54, ~~characterized in that~~wherein said optomechanical and/or acousto-optical and/or electro-optically active auxiliary means are selected from the group ~~comprising~~ consisting of mechanical shutters and rotating choppers which in each case alternately block and release the light path between the excitation light source and the interaction space, polarization-selective components ~~such as, for example, rotating half-wave plates in combination with polarizers, liquid crystal attenuators, electro-optically active crystals, neutral density filters that are locally or temporally variable in terms of their transmission~~, acousto-optical modulators and ~~also~~ modulators based on interference effects~~, such as, for example, Michelson interferometers or Mach-Zehnder interferometers~~.

56. (Currently Amended) The analytical system as claimed in ~~one of claims 50 - 53~~claim 50, ~~characterized in that~~ wherein the modulation of the excitation light radiated ~~in to~~into an interaction space is effected by means of direct, active modulation of the light radiated from the excitation light source.

57. (Currently Amended) The analytical system as claimed in claim 56, ~~characterized in that~~ wherein the modulation of the excitation light radiated in to an interaction space is effected by means of modulation of the excitation current for a semiconductor laser as excitation light source.

58. (Currently Amended) The analytical system as claimed in claim 50~~one of claims 50 - 57~~, ~~characterized in that~~wherein the modulation of the excitation light radiated into~~in to~~ an interaction space is effected periodically.

59. (Currently Amended) The analytical system as claimed in ~~one of claims 50 - 57~~claim 50, ~~characterized in~~ wherein ~~that~~ the modulation of the excitation light radiated ~~in to~~into an interaction space is effected non-periodically.

60. (Currently Amended) The analytical system as claimed in ~~one of claims 50 - 59~~claim 50, ~~characterized in that~~ wherein the modulation of the excitation light radiated into~~in to~~ an interaction space consists of~~in the~~ modulation of the intensity radiated in.

61. (Currently Amended) The analytical system as claimed in ~~one of claims 50 - 59~~claim 50, ~~characterized in that~~wherein the modulation of the excitation light radiated ~~in to~~into an interaction space consists ~~in the~~of simultaneous modulation of ~~the~~ pulse duration and ~~the~~ peak power of the excitation light radiated in~~, the peak power preferably being varied inversely proportionally to the pulse duration and the integral of the pulse power particularly preferably remaining constant~~.

62. (Currently Amended) The analytical system as claimed in ~~one of claims 50 - 61~~claim 50, wherein the system~~characterized in that it~~ is effected without detection of the modulated excitation light or a measurement variable proportional thereto.

63. (Currently Amended) The analytical system as claimed ~~in one of claims 50 - 61~~claim 50, ~~characterized in that it~~ wherein the system comprises, in addition to the detection of the light emerging from the interaction spaces, a detection of the modulated excitation light or a measurement variable proportional thereto.

64. (Currently Amended) The analytical system as claimed in ~~one of claims 50 - 63~~claim 50, ~~characterized in that~~ wherein the detection of the light emerging from the interaction spaces is effected in a manner temporally correlated with the modulation of the excitation light power.

65. (Currently Amended) The analytical system as claimed in claim 64, wherein ~~characterized in that~~ the detection of the light emerging from the interaction spaces is effected with a frequency corresponding to an integer multiple of the modulation frequency of the excitation light power.

66. (Currently Amended) The analytical system as claimed in ~~one of claims 50 - 65~~claim 50, ~~characterized in that~~wherein the separation of the data representative of the ~~the response signal~~ portions of the light emerging from the interaction ~~space that~~spaces which are ~~correlated~~ nonlinearly proportional to ~~with~~ the excitation light power from the data representative of the remaining ~~signal~~ portions of said light is effected ~~with the aid of~~ using a parallel series

expansion~~, preferably with the aid of a parallel Taylor expansion~~.

67. (Currently Amended) The analytical system as claimed in ~~one of claims 50 - 65~~claim 50, ~~characterized in that~~wherein the separation of the data representative of the ~~response signal~~ portions of the light emerging from the interaction ~~space that~~spaces which are ~~correlated~~ nonlinearly proportional to ~~with~~ the excitation light power from the data representative of the remaining ~~signal~~ portions of said light is effected ~~with the aid of~~ using a harmonic analysis.

68. (Currently Amended) The analytical system as claimed in ~~one of claims 50 - 65~~claim 50, ~~characterized in that~~ wherein the separation of the data representative of the ~~response signal~~ portions of light emerging from the interaction ~~space that~~spaces which are ~~correlated~~ nonlinearly proportional to ~~with~~ the excitation light power from the data representative of the remaining ~~signal~~ portions of said light is effected ~~by means of a~~ using a stepped modulation of the excitation light power.

69. (Currently Amended) The analytical system as claimed in ~~one of claims 50 - 65~~claim 50, ~~characterized in that~~ wherein the separation of the data representative of the ~~response signal~~ portions of light emerging from the interaction ~~space that~~spaces which are ~~correlated~~ nonlinearly proportional to ~~with~~ the excitation light power from the data representative of the remaining ~~signal~~ portions of said light is effected using a four-step algorithm for the modulation of the excitation light power.

70. (Currently Amended) The analytical system as claimed in claim 50~~one of claims 50 - 69~~, ~~characterized in that~~ wherein the interaction space is an interaction layer at a surface of a fixed carrier, the areal extent of the interaction layer ~~space (on said surface of this carrier)~~ being defined by the interaction area with the impinging power-modulated excitation light and its depth ~~(extent perpendicular to said surface of the carrier)~~ being defined by the range of the modulated excitation light intensity in this space dimension perpendicular to said surface of the carrier.

71. (Currently Amended) The analytical system as claimed in claim 70, ~~characterized in that~~wherein there are situated within the interaction space compounds or substances or molecular subgroups which, under the action of the excitation light, are capable of emitting optical signals correlated nonlinearly therewith, or with the aid of which, after the interaction thereof with further compounds present in the interaction space, optical signals correlated nonlinearly with the excitation light can be generated.

72. (Currently Amended) The analytical system as claimed in claim 70, wherein ~~characterized in that~~ there are immobilized on the surface of said fixed carrier one or a plurality of specific binding partners for the detection of one or a plurality of analytes in a binding assay ~~(with the binding partner from a supplied solution binding to the immobilized binding partner)~~, the analyte detection being effected ~~on the basis of~~using an optical response ~~signal—~~ signal, correlated nonlinearly with the excitation light ~~power—~~power, of the immobilized binding partner itself or of the binding partner supplied in solution for binding to the immobilized binding partner or of one or a plurality of further binding partners supplied in one or a plurality of additional method steps.

73. (Currently Amended) The analytical system as claimed in claim 72, ~~characterized in that~~wherein the specific binding partners immobilized on the surface of said fixed carrier are the one or the plurality of analytes themselves which are immobilized, wherein the specific binding partners are ~~in a manner~~ embedded in a native sample matrix or in a ~~form of the~~ sample matrix that is modified by ~~means of~~ one or a plurality of conditioning steps.

74. (Currently Amended) The analytical system as claimed in claim 72, ~~characterized in that~~wherein the specific binding partners immobilized on the surface of said fixed carrier are biological or biochemical or synthetic identification elements for the specific identification of one or a plurality of analytes situated in a supplied sample.

75. (Currently Amended) The analytical system as claimed in ~~one of claims 72 - 74~~claim 72, ~~characterized in that~~wherein said binding partners~~, that is to say the analytes to be detected that are themselves immobilized or the analytes to be detected in a supplied sample and/or their biological or biochemical or synthetic identification elements that are immobilized or supplied in a supplied detection reagent,~~ are selected from the group ~~comprising~~ consisting of proteins~~, for example monoclonal, or polyclonal antibodies and antibody fragments~~, peptides, enzymes, glycopeptides, oligosaccharides, lectins, antigens for antibodies, proteins functionalized with additional binding sites, ~~("tag proteins", such as, for example, "histidine tag proteins"), and also~~ nucleic acids, ~~(for example DNA, RNA, oligonucleotides) and~~ nucleic acid analogs, ~~(eg. PNA),~~ aptamers, membrane-bound and isolated receptors and ligands thereof, cavities produced by chemical synthesis for receiving molecular imprints, natural polymers and synthetic polymers~~, etc~~.

76. (Currently Amended) The analytical system as claimed in ~~one of claims 71 - 75~~claim 71, ~~characterized in that,~~ wherein the compounds or substances or molecular subgroups are applied on the surface of said fixed carrier, ~~applied compounds or substances or molecular subgroups which, under the action of the excitation light, are capable of emitting optical signals correlated nonlinearly therewith, or with the aid of which, after the interaction thereof with further compounds present in the interaction space, optical signals correlated nonlinearly with the excitation light can be generated, or applied specific binding partners~~ and are immobilized in discrete measurement regions ~~(spots)~~ which may have an arbitrary geometry, ~~for example circular, oval, triangular, rectangular, polygonal form, etc., it being possible for~~ wherein an individual measurement region ~~to~~ can optionally contain identical or different compounds or substances or molecular subgroups or specific binding partners.

77. (Currently Amended) The analytical system as claimed in claim 76, ~~characterized in that~~wherein more than 10~~, preferably more than 100, particularly preferably more than 1000~~ measurement regions are arranged on a square centimeter in a two-dimensional arrangement on the surface of said fixed carrier.

78. (Currently Amended) The analytical system as claimed in ~~one of claims 70 - 77~~claim 70, ~~characterized in that~~ wherein said fixed carrier is optically transparent at a~~the~~ wavelength of an~~the~~ acting excitation light.

79. (Currently Amended) The analytical system as claimed in ~~one of claims 70 - 78~~claim 70, ~~characterized in that~~wherein said fixed carrier is essentially planar.

80. (Currently Amended) The analytical system as claimed in ~~one of claims 70 - 79~~claim 70, ~~characterized in that~~ wherein said fixed carrier comprises an optical waveguide structure, comprising one or a plurality of layers.

81. (Currently Amended) The analytical system as claimed in ~~one of claims 70 - 80~~claim 70, ~~characterized in that~~wherein said fixed carrier comprises a planar optical waveguide that is continuous or divided into discrete wave-guiding regions~~, comprising~~ and comprises one or a plurality of layers.

82. (Currently Amended) The analytical system as claimed in claim 70~~one of claims 70 - 81~~, ~~characterized in that~~wherein said fixed carrier comprises a planar optical thin-film waveguide with an essentially optically transparent, wave-guiding layer (a) on a second, ~~likewise~~ essentially optically transparent layer (b) having a lower refractive index than layer (a) and~~, if appropriate, a likewise~~ optionally an essentially optically transparent intermediate layer (b') between layer (a) and layer (b) ~~likewise~~ having a lower refractive index than layer (a).

83. (Currently Amended) The analytical system as claimed in ~~one of claims 80 - 82~~claim 80, ~~characterized in that~~wherein a wave-guiding layer of said fixed carrier is in optical contact with one or a plurality of optical coupling elements which enable excitation light to be coupled into said wave-guiding layer, said optical coupling elements being selected from the group of consisting of prism couplers, evanescent couplers with united optical waveguides with overlapping evanescent fields, end face couplers with focusing lenses~~, preferably cylindrical lenses,~~ arranged before an end side of said wave-guiding layer of the evanescent field sensor platform, and grating couplers.

84. (Currently Amended) The analytical system as claimed in ~~one of claims 80 - 83~~claim 80, ~~characterized in that~~wherein a wave-buiding layer of the fixed carrier comprises one or a plurality of grating structures (c) which enable excitation light to be coupled in ~~are fashioned in a wave-guiding layer of the fixed carrier~~.

85. (Currently Amended) The analytical system as claimed in claim 80~~one of claims 80 - 84~~, ~~characterized in that~~wherein a wave-guiding layer of the fixed carrier comprises one or a plurality of grating structures (c') having an identical or different grating period and grating depth with respect to grating structures (c) ~~are fashioned in a wave-guiding layer of the fixed carrier~~ and enable light guided in said wave-guiding layer to be coupled out.

86. (Currently Amended) The analytical system as claimed in ~~one of claims 50 - 85~~claim 50, ~~characterized in that~~wherein said portions of the light emerging from the interaction spaces which are ~~optical emission signals that are correlated~~ nonlinearly proportional to ~~with~~ the excitation light intensity comprise the signals of a frequency doubling ~~("second harmonic generation")~~, summation or differential frequency generation.

87. (Currently Amended) The analytical system as claimed in ~~one of claims 50 - 86~~claim 50, ~~characterized in that~~wherein said ~~optical emission signals that~~data representative of the portion of the light emerging from the interaction spaces which are ~~correlated~~ nonlinearly proportional to ~~with~~ the excitation light intensity are induced by a multi-photon absorption.

88. (Currently Amended) The analytical system as claimed in claim 87, ~~characterized in that said optical emission signals that are correlated nonlinearly with the excitation light intensity are induced by~~ wherein said multiphoton absorption is a two-photon absorption.

89-90. (Cancelled)